that Corwin teaches the present device except the prestress layer is bonded to the convex side of the piezoelectric layer; and Haertling teaches that the prestress layer can be attached to the concave side of the piezoelectric element if desired.

**(2)** The Examiner further argues that Haertling teaches the present device except the prestress layer is integral with the piezoelectric element. The Examiner asserts that making parts integral or separable (referring to the prestress and piezoelectric elements) has long been held to be within the skill expected of the routineer. Further, it would have been obvious to one of ordinary skill in the art that Haertling could be provided as two separate, bonded, layers, as Corwin explicitly teaches providing a prestress layer as a separate element and Haertling teaches that a separate layer device was known before the monolithic structure was preferred. The two layer structure, while not preferred by Haertling, is taught as suitable for small load applications, and would be less costly to produce. Thus, it would have been obvious to one skilled in the art that Haertling could be provided as two separate, bonded, layers.

In specifically addressing the amendment to the claim 17 that the Applicants made in their response of November 30, 2000, the Examiner stated that "distinct" is interpreted as being "discernable different." Thus, "even the treated layer" of Haertling would be considered "untreated piezoelectric portion," and certainly the two layers of Corwin are clearly distinct. With respect to Haertling, the Applicant's interpretation of the Examiner's remarks is that the treated and untreated portions are considered "distinct."

Applicants respectfully reiterate their assertion that the present invention is nonobvious over Corwin in view of Haertling or vice versa.

**(1) Prestress layer - concave/convex attachment**

The Applicants respectfully assert that:

(a) Haertling and Corwin use different approaches with fundamentally different purposes and teach away from one another; therefore, it is not logical to someone skilled in the art to combine the two.

(b) There is no suggestion, either express or implied, in Haertling or Corwin to combine the two.

Corwin teaches a spherical transducer, and the prestress used in Corwin has a fundamentally different purpose than the prestress in the present invention. Corwin's stress plating on the outside of the sphere seeks to contain piezoelectrically-generated,

outward-directed, stresses that are inclined to explode the sphere at high signal levels; i.e., the prestress layer used by Corwin serves to protect the ceramic from breakage. The spherical configuration inherently only allows very small mechanical output motion. The spherical shape of the transducer prevents, rather than promotes, the large mechanical output motion desired by Haertling.

When a prestress (tensile) layer is applied to the outside (convex) surface of a hollow sphere of piezoelectric material, as taught by Corwin, the combined two layers will attempt to become more concave toward the outside of the sphere; i.e., toward the prestressing layer side. The spherical shape, however, prevents the flattening of its surface at any point since that would require other points of the sphere's surface to become more convex. In Haertling's wafer, the tension/compression state results (unlike the sphere) in the two portions becoming more concave toward the reduced portion side, due to the nature of the stresses induced and the materials' reaction thereto. Therefore, the electrically active portion will always be more concave toward the reduced side.

**(2) Integral/Separable Elements**

The Applicants again assert that the "separation" of a chemically reduced portion of a monolithic structure from the unreduced portion of that monolithic structure, and the substitution with bonded layers, is neither obvious nor is it analogous to the substitution of a removable cap of a lipstick holder for a press fitted cap, *In re Dulberg*, 289 F.2d 522, 523, 129 USPQ 348, 349 (CCPA 1961), or the substitution of an integral brake drum apparatus for a single unit with rigidly secured parts, *In re Larson*, 340 F.2d 965, 968, 144 USPQ 347, 349 (CCPA 1965), (referencing MPEP 2144.04(V)(B) and (C)). Instead, the "separation" is analogous to *Schenck v. Nortron Corp.*, 713 F.2d 782, 218 USPQ 698 (Fed. Cir. 1983) (referencing MPEP 2144.04 (V)(B)), showing insight that was "contrary to the understanding and expectations of the art." The present invention uses separate prestress and piezoelectric layers, which is explicitly taught against in Haertling. Haertling teaches a prestressed ceramic device and method, and explicitly discounts bonding of separate layers; instead, Haertling perceives a need for eliminating bonded components. Corwin uses separate layers, but is directed to a different problem than Haertling and produces a fundamentally different response. Use of separate layers to achieve internal asymmetric stress with accompanying large mechanical output is contrary to the teachings and expectations of Haertling and Corwin. Furthermore, the reduced

portion of the ceramic in Haertling is in undesirable tension, which inhibits the reliability desired. The present invention places the entire piezoelectric layer in compression.

As argued in (1) above, Haertling and Corwin use different approaches with fundamentally different purposes and teach away from one another; therefore, it is not logical to someone skilled in the art to combine the two; and there is no suggestion, either express or implied, in Haertling or Corwin to combine the two.

The Applicants reiterate their earlier arguments that Haertling states that none of the prior art approaches, including bonding various materials to a piezoelectric element (see col. 2, lines 30-67), could produce a piezoelectric device having the desired functionality, i.e., including the ability to produce relatively large strains and sustain moderate loads, as well as have an asymmetrical internal stress bias to produce above-plane axial displacement (see also col. 4, lines 19-26). In addition, as stated above, Corwin teaches a device that has a fundamentally different purpose and results than Haertling. Therefore, there is no explicit or implied motivation to modify the monolithic device of Haertling to achieve the desired stress state with the plural, bonded layers of Corwin, nor is there a reasonable expectation of success from such modification, in view of the prior art reviewed by Haertling. Thus, the present invention shows insight that is contrary to the understanding and expectations of the art cited by the Examiner, as well as the art cited by Haertling. Haertling teaches away from using separate, bonded layers. Haertling does not merely state that bonded layers would provide inferior properties; instead Haertling states that bonded layers would be unlikely to produce the result sought, which is the ability to produce relatively large strains and sustain moderate loads, as well as have an asymmetrical internal stress bias to produce above-plane axial displacement (see col. 4, lines 19-26).

Therefore, the combination of Haertling and Corwin do not teach the claimed invention as a whole, including the convex surface of the prestressing layer bonded to the concave surface of the piezoelectric layer and imparting a prestress on the piezoelectric layer such that the piezoelectric layer is in compression. Therefore, Applicants respectfully submit that claims 17-24 are not obvious over Haertling in view of Corwin.

In view of the above, Applicants submit that the present invention as claimed is not obvious. Thus, reconsideration of the amended application and early allowance is respectfully requested.

Respectfully submitted,

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